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FIELD EVALUATION OF FUNGICIDES AGAINST BLAST (*PYRICULARIA GRISEA*) DISEASE OF PADDY

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ABSTRACT

Rice (Oryza sativa L.) is the second most important cereal crop grown in India. It is a stable food in several major parts of the country. Blast is one of the most important diseases on rice caused by Pyricularia grisea. The pathogen known to attack paddy crop on various stages viz., seedling, tillering and panicle emergence stages due to severe infection the leaves becomes dried and appear to burnt appearance in nursery and also in main field, resulting reduction in the yield of paddy. Twenty two new fungicides were evaluated at recommended doses during tillering, booting and heading stages for the management of blast disease at ponnampet, Mercara district. The fungicides Win, Tricyclazole, Filia and Amistar significantly reduced incidence of leaf and neck blast and increased seed yield than compared to control. The neck blast incidence in Win, Amistar, Tricyclozole and Filia sprayed field was 7.80, 10.87, 13.67 and 20.17 per cent respectively. The highest seed yield was recorded in Filia, Tricyclozole, Sivic, Win and Amistar sprayed fields i.e., 5525, 5527,5251,4905, and 3648kg/ha respectively. The leaf blast and neck blast incidence in control was 29.30 and 58.32 per cent respectively and lowest yield recorded in control field i.e., 619 kg/ha. The new fungicides Win, Amistar and Filia were effective against blast disease and these fungicides are effective in the management of blast disease. Tricyclazole was the best fungicide in controlling the blast disease and increasing yield. Among all the fungicide, Beam and Protega were highly effective against blast disease.

KEYWORDS: Seedling, Tillering, Panicle Emergence Stages, Yield of Paddy

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Original Article

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereal crops and it belongs to the family Poaceae. It is the staple food crop for 70 per cent of the world's population. Rice occupied a total area up to 37 per cent under food grains production in the world's and it stands First place and next cereal crop is wheat. Rice crop is affected by many diseases caused by fungi, bacteria, viruses, phytoplasma, nematodes and other non-parasitic disorders. Among the fungal diseases, blast (Pyricularia grisea (Cook) Sac.) brown leaf spot [Exerohilum oryzae (Van Breda de Haan.) Subram. And Jain] and sheath blight of rice (Rhizoctonia solani Kuhn) are the more prevalent and destructive ones.

Blast is caused by Pyricularia grisea Sac. is the most important fungal disease. This occurs in all rice growing regions. The pathogen known to attack paddy crop on various stages viz., seedling, tillering and panicle emergence stages and pathogen infecting various plant parts viz., leaf, sheath, stem, neck, panicles and grain discolourations and due to severe infection of the pathogen the leaves becomes dried and appear to burnt appearance in nursery and also in main field. The pathogen also infect neck and panicles during maturity stage of the crop resulting chaffyness of the panicles and discoloration of grain resulting reduction in the yield of

paddy.(Goto, 1965). Blast disease has long been known on rice. Blast is generally considered as the major disease of rice; because of its wide spread distribution and its destructiveness under favourable conditions. The present investigation was attempted to manage blast pathogen Pyricularia griseaunder field conditions by using fungicides.

Several fungicides were tried under field conditions against blast disease management in various locations. Lewin*et al.,* (1986) obtained maximum control of *P.oryzae* with pyroquilon and chlorobenthiazone. Mbodj*et al*., (1988) found that, tricyclazole was effective to reduce infection of *P.oryzae*. Okhovot (1989) obtained maximum control of neck blast with tricyclazole. El-Kazza*et al.* (1990) observed maximum reduction of rice blast with pyroquilon followed by Beam, edifenphos and iprobenfos. Saikia (1991) found the fungicides, edifenphos, thiophenate methyl and carbendazim reduced leaf and neck blast infections by 7.5-80.8 and 60.5-64.5 per cent, respectively. Enyinnia (1996) observed that, tricyclazole and benomyl suppressed foliar and neck blast development, but tricyclazole was superior to benomyl.

MATERIAL AND METHODS

The systemic and non-systemic fungicides were evaluated under field conditions against blast pathogen. Field experiment was carried out at ARS, Ponnampet to study the efficacy of new fungicides molecules against blast disease in a randomized complete block design (RCBD) with a plot size of 2.0 x 1.5 m^2in three replications. The variety Intan is highly susceptible to blast disease was used for this experiment. New fungicides *viz.,* Anthracnol (0.3 %), Armure (0.05 %, 0.07 %, 0.1%), Amistar (0.075 %, 0.1 %), Bitertano (0.1 %), Contaf (0.2 %), Filia (0.1 %, 0.15 %, 0.2 %), Hinosan (0.1 %), Kasu-B (0.25 %), Ril-FA(0.125 %, 0.25 %), Saaf (0.15 %), Sivic (0.06 %) and Protega (0.1 %) were used for evaluation against blast disease and sterile distilled water sprayed plot was treated as control. The observations on leaf and neck blast along with seed yield were recorded. Five fungicides *viz.,* Tricyclazole (0.05%), Carbendazim (0.1%), Hinosan (0.1%), Kitazin (0.1%) and Protega (0.1%) along with Neemazal (0.3 %) were sprayed during Nursery, tillering and panicle initiation stage for evaluation against blast disease and sterile distilled water sprayed plot was treated as control. The observations on leaf and neck blast along with seed yield were recorded.

RESULT AND DISCUSSIONS

The fungicides were evaluated in field conditions against rice blast. The new fungicides were sprayed during tillering and panicle emergence stage with different dosage. The observations on leaf blast, neck blast and seed yield were recorded. Among 22 fungicides Win (Protega), Filia, Tricyclazole and Amistar fungicide sprayed rice field observed low incidence of leaf and neck with higher yield. Leaf blast incidence was 6.51, 3.31, 6.03 and 10.23 per cent observed in the fungicides Win, Amistar, Tricyclazole, Filia at 2ml /l and Filia at 1.5ml /l sprayed field respectively. The neck blast incidence in Win, Tricyclazole and Filia sprayed field was 7.80, 10.87, 13.67 and 15.31 per cent respectively. The highest seed yield recorded in win, Tricyclazole, Filia and Win sprayed fields *i.e.,* 5909, 5527, 5525, 5488 and 3648 $kgha^{-1}$ respectively (Table 1). The leaf blast and neck blast incidence in control was 29.30 and 58.32 per cent respectively and lowest yield recorded in control field i.e., 619 $kgha^{-1}$(Table 1).

Fungicides were evaluated against blast by seed treatment and foliar application to the nursery on susceptible Intan variety. Among these treatments the fungicide protega seed treatment was recorded lowest leaf blast (6.00%) and neck blast (22.98%) with highest seed yield of 1702kg/ha followed by beam fungicide with was effective against blast disease. Similarly, protega in nursery spray was recorded the lowest leaf spot of 3.50 and more blast (30.86) with seed yield 2333kg/ha (Table 2).

The commercial fungicides were sprayed during tillering stage. Protega and beam fungicide were reduced neck blast incidence 17.70 and 27.13 per cent respectively and maximum seed yield i.e., 2600 and 2199kg/ha was recorded in these two fungicides respectively (Table 3).

The efficacies of various fungicides were tested by spraying during panicle emergence stage. The observations on leaf and neck blast severity were recorded. The minimum leaf blast (4.33%) and neck blast (15.57%) and highest seed yield (3010.5 kg/ha) was recorded in Protega sprayed field. The maximum leaf blast (28.33%) and neck blast (67.92%) with lowest yield (921.5Kg/ha) was observed in untreated control (Table 3).

The commercial fungicides *viz.*, Hinson, Bavistin, Fuzi-one, Beam, Kitazin, Protega were evaluated against blast disease during *Kharif*2004-05 and 2005-06 on susceptible variety Intan. The results revealed that the minimum leaf blast was noticed in Protega (1.33%) followed by Beam (4.0%) and Fuzi-one (5.0 %). The maximum leaf blast (25.02%) and neck blast (31.78%) was observed in unsprayed field. The maximum control of neck blast was achieved against in treatment Protega followed by Beam and Fuzi-one with 6.29, 6.89 and 10.73 per cent respectively. The maximum seed yield recorded in Protega (5,556kg/ha) and Beam 5905(4,572kg/ha) sprayed field. The minimum seed yield was recorded in Hinosan (2,217kg/ha) and unsprayed field (1,005kg/ha) (Table. 1).

The new fungicides Win, Amistar and Filia were effective against blast disease and these fungicides on par with the fungicide Tricyclazole, which is commonly use for the management of blast disease. Tricyclazole fungicide is also equally effective in controlling blast disease similar kind of work was also recorded by Prajapati(2004); Govindaraju*et al*., (2005), Hossainand Kulkarni (2001); Srivastaval (1999); Yang (1998); Sood and Kapoor (1997) and Enyinnia (1996). The fungicide Tricyclozole is effective in the management of blast disease, it may be due to lesion expansion of limited and sporulation decreased in sprayed leaves. Peroxide activity was high in rice leaves treated with the blasticide while cycloheximide decreased the control effect of tricyclozole (Yang, 1998).

Without sprayed field recorded highest neck blast incidence (66.32%) with lowest seed yield (885kg/ha). Peterson (1990) reported the fungicide Tricyclazole interferes with appressorial function by inhibiting melanin biosynthesis and host penetration. Protega followed by Protega or Beam followed Beam recorded least incidence of neck blast i.e., 12.01 and 17.23 per cent with highest yield 4169 and 3644 kg/ha respectively. Protega (Carpropamid) inhibiting melanin biosynthesis and also potentiates the activation of defense responses during fungal invasion was reported by Thieron *et.al.,* (1999). In field without spray recorded highest neck blast incidence (66.32%) with lowest seed yield (885 kg/ha).

The new fungicides Win, Amistar and Filia were effective against blast disease and these fungicides on par with the fungicide Tricyclazole, which is commonly use for the management of blast disease. Commercial fungicides *viz.*, Hinosan, Bavistin, Fuzi-one, Beam, Kitazin and Protega against blast disease during 2004-05 and 2005-06 reduced the disease incidence and increased grain yield compared with the untreated control. Tricyclazole was the best fungicide in controlling the blast disease and increasing yield. Among all the fungicide, Beam and Protega were highly effective against blast disease.

CONCLUSIONS

The fungicide *viz.*, Hinosan, Bavistin, Beam and Protega were applied seed treatment or Nursery spray or Tillering spray and or Panicle emergence stage for the management of blast disease during 2004-05 and 2005-06. In all four applications, the fungicide Protega and Beam reduced leaf blast and neck blast incidence and increased seed yield.

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APPENDICES

Table 1: Evaluation of New Fungicide for Blast Disease Management during 2011-12 and 2012-13 (Mean)

No	Treatments	Concentration (%)	Leaf Blast (%)	Neck Blast (%)	Seed Yield (Kg /ha)
1.	Anthracnol	0.3	9.60	19.00	2298
2.	Armure	0.05	21.65	32.72	1681
3.	Armure	0.07	8.18	48.96	1309
4.	Armure	0.1	4.47	26.26	2307
5.	Amistar	0.075	20.03	14.31	3648
6.	Amistar	0.1	10.01	20.17	3565
7.	Bitertano	0.1	15.02	29.03	2405

Table 1: Contd.,					
8.	Carbendazim	0.1	26.61	12.81	3900
9.	Contaf	0.2	10.01	48.16	1204
10.	Filia	0.1	7.59	25.70	4833
11.	Filia	0.15	10.23	15.31	5488
12.	Filia	0.2	6.03	13.67	5525
13.	Hinosan	0.1	26.61	12.81	3900
14.	Kasu-B	0.25	4.57	27.28	5051
15.	Ril-FA	0.125	4.43	20.75	2405
16.	Ril-FA	0.25	1.34	18.61	3461
17.	Saaf	0.15	19.87	27.77	2209
18.	Tricyclazole	0.05	4.79	34.59	4825
19.	Tricyclazole	0.06	3.31	10.87	5527
20.	Result	0.1	26.61	46.76	1094
21.	Sivic	0.06	3.80	20.14	5251
22.	Protega (Win)	0.1	6.51	7.80	5905
23.	Control	-	29.30	58.32	619
	CD at 5%	-	1.43	1.95	997.7
	CV (%)	-	19.8	8.6	31.9

Table 2: Effect of Fungicides by Nursery Spray against Leaf and Neck Blast with Comparisons with Yield

Sl No.	Treatments	Concentration (%)	Percent Leaf blast			Percent Neck blast			Yield Kg/ha		
			2011-12	2012-13	Mean	2011-12	2012-13	Mean	2011-12	2012-13	Mean
1.	Hinasan	0.1	10.00	13.33	11.67	50.66	45.90	45.90	1305	1656	1480.50
2.	Bavistin	0.1	6.66	11.66	9.16	30.35	52.11	52.11	1500	2263	1881.30
3.	Beam	0.06	5.00	5.00	5.00	27.71	39.60	39.60	1981	1941	1961.00
4.	Protega	0.1	2.00	5.00	3.50	13.10	17.76	15.43	2450	2216	2333.00
5.	Neemazal	0.3	5.00	8.33	6.67	23.44	46.87	46.87	1750	1466	1608.00
6.	Control		35.00	28.33	31.67	60.95	77.86	77.86	370	928	649.00
Mean			13.05	13.06	13.06	37.46	51.05	51.05	1235.54	1620.73	1428.13
CD @ 5%			6.34	5.15	---	10.20	12.06	---	420.90	396.81	----
CV (%)			28.52	23.10	---	15.26	13.85	---	20.14	14.33	----
S.Em±			2.15	1.74	---	5.15	4.09	---	142.67	134.51	------

Table 3: Efficacy of Fungicides Spray during Tillering and Panicle Emergence Stage for the Management of Leaf and Neck Blast

Sl. No.	Treatments	Concentration (%)	Percent Leaf Blast			Percent Neck Blast			Yield Kg/ha		
			2011-12	2012-13	Mean	2011-12	2012-13	Mean	2011-12	2012-13	Mean
I: Tillering Stage											
1	Hinosan	0.1	21.66	10.00	15.83	33.38	30.09	31.73	1491	2042	1766.5
2	Bavistin	0.1	13.33	11.66	12.49	24.98	30.48	27.73	1755	2151	1953.0
3	Beam	0.06	7.00	5.00	6.00	24.18	30.09	27.13	1939	2459	2199.0
4	Protega	0.1	5.00	3.00	4.00	13.58	21.83	17.70	2404	2796	2600.0
5	Neemazal	0.3	15.00	10.00	12.50	26.53	30.96	28.75	1589	1467	1528.0
II: Panicle Emergence Stage											
6	Hinosan	0.1	25.00	15.00	20.00	23.34	32.83	28.05	2516	2527	2521.5
7	Bavistin	0.1	23.33	6.66	14.99	22.95	32.84	27.89	3150	2484	2817.0
8	Beam	0.06	14.00	4.00	9.00	25.43	28.19	26.81	3133	2618	2875.5
9	Protega	0.1	6.66	2.00	4.33	12.14	19.00	15.57	3183	2838	3010.5
10	Neemazal	0.3	19.00	10.00	14.5	20.09	34.91	27.50	2730	2019	2374.5
11	Control	-	36.66	20.00	28.33	50.37	85.46	67.92	886	957	921.5
Mean			16.96	8.84	12.90	25.17	34.24	29.71	2252.3	2214.36	2233.36
CD @ 5%			5.18	4.86	-------	11.80	9.47	--------	624.03	424.19	--------
CV%			17.73	32.27	-------	27.29	16.24	--------	15.75	11.24	--------
S.Em±			1.75	1.64	-------	4.00	3.21	--------	211.53	143.79	---------